

No periments...

Ex Marking (Examples)

International (IEC)

Ex ia IIC T6

Ex.....● Explosion protected
ia.....● Type of protection
II.....● Group
C.....● Gas Group
T6.....● Temperature Class

US (NEC 505)

Class I, Zone 0, AEx ia IIC T6

Class I.....● Permitted Class
Zone 0.....● Permitted Zone
A.....● American National Standard
Ex.....● Explosion protected
ia.....● Type of protection
II.....● Group
C.....● Gas Group
T6.....● Temperature Class

US (NEC 500)

I.S., Class I, Division 1
Groups A, B, C, D, T6

I.S.● Type of protection
Class I.....● Permitted Class
Division 1....● Permitted Division
Groups A-D ● Permitted Gas Group
T6.....● Temperature Class

EC (CENELEC)

EEx ia IIC T6

E.....● European Standard
Ex.....● Explosion protected
ia.....● Type of protection
II.....● Group
C.....● Gas Group
T6.....● Temperature Class

Directive 94/9/EC (ATEX 100a) required July 1, 2003



II2G

Equipment Groups I Mines
II other than mines

Categories 1 for Zone 0, 20
2 for Zone 1, 21
3 for Zone 2, 22
M1, M2 for Mines

Materials G for gases, vapours and mist
D for dusts

Area Classification for gases and vapours

Zone 2 (Zone 22 - dusts)
Zone 1 (Zone 21 - dusts)
Zone 0 (Zone 20 - dusts)

Zone 2
Zone 1
Zone 0

Division 2 gases and vapours
Division 1 gases and vapours (dusts, fibers or flyings)

Zone 2 (Zone 22 - dusts)
Zone 1 (Zone 21 - dusts)
Zone 0 (Zone 20 - dusts)

flammable material

present abnormally
present intermittently
present continuously

Protection Concepts

Type of Protection	Code	Permitted Use	Code	Permitted Use	Code	Permitted Use	Code	Permitted Use	Standards	Protection Principle
Increased Safety	Ex e	Zone 1, 2	AEx e	Class I, Zone 1, 2					IEC 60079-7 FM 3619, UL 2279-7 EN 50019	No arcs, sparks or hot surfaces
Non-sparking	Ex nA	Zone 2	AEx nA	Class I, Zone 2			EEx e	Zone 1, 2	IEC 60079-15, EN 50021, UL 2279-15 FM 3611, UL 1604	
Non-incendive					NI	Class I, Div 2	EEx nA	Zone 2		
Flameproof	Ex d	Zone 1, 2	AEx d	Class I, Zone 1, 2					IEC 60079-1 FM 3618, UL 2279-1 EN 50018	Contain the explosion and quench the flame
Explosionproof							EEx d	Zone 1, 2	IEC 60079-1 FM 3615, ANSI/UL 1203	
Powder Filled	Ex q	Zone 1, 2	AEx q	Class I, Zone 1, 2	XP	Class I, Div 1, 2			IEC 60079-5 FM 3622, UL 2279 EN 50017	
Protected Contacts	Ex nC	Zone 2	AEx nC	Class I, Zone 2			EEx q	Zone 1, 2	IEC 60079-15, EN 50021, UL 2279-15	
Intrinsic Safety	Ex ia	Zone 0, 1, 2					EEx nC	Zone 2		
	Ex ib	Zone 1, 2	AEx ia	Class I, Zone 0, 1, 2					IEC 60079-11 FM 3610, UL 2279-11	Limit energy of sparks and surface temperature
			AEx ib	Class I, Zone 1, 2					FM 3610, ANSI/UL 913	
					IS	Class I, Div 1, 2	EEx ia	Zone 0, 1, 2	EN 50020/50 039	
							EEx ib	Zone 1, 2	EN 50020/50 039	
Limited Energy							EEx nL	Zone 2	IEC 60079-15, EN 50 021	
Pressurized	Ex p	Zone 1, 2	AEx p	Class I, Zone 1, 2	PX, PY PZ	Class I, Div 1, 2 Class I, Div 2			IEC 60079-2, UL 2279-2 FM 3620, ANSI/NFPA 496 FM 3620, ANSI/NFPA 496	
							EEx p	Zone 1, 2	EN 50016	Keep flammable gas out
Encapsulation	Ex m	Zone 1, 2	AEx m	Class I, Zone 1, 2			EEx nP	Zone 2	EN 50021 IEC 60079-18 FM 3614, UL 2279-18	
							EEx m	Zone 1, 2	EN 50028 IEC 60079-6 FM 3621, UL 2279	
Oil Immersion	Ex o	Zone 1, 2	AEx o	Class I, Zone 1, 2					EN 50015	
							EEx o	Zone 1, 2		
Restricted Breathing	Ex nR	Zone 2	AEx nR	Class I, Zone 2			EEx nR	Zone 2	IEC 60079-15, EN 50021, UL 2279-15	

Apparatus Grouping

Typical Gas, Dust, Fiber

Acetylene	Group IIC	Group IIC	Class I/Group A	Group IIC
Hydrogen	(Group IIB + H ₂)	(Group IIB + H ₂)	Class I/Group B	(Group IIB + H ₂)
Ethylene	Group IIB	Group IIB	Class I/Group C	Group IIB
Propane	Group IIA	Group IIA	Class I/Group D	Group IIA
Methane	Group I	Group I*	Mining*	Group I
Metal Dust	-	-	Class II/Group E	-
Coal Dust	-	-	Class II/Group F	-
Grain Dust	-	-	Class II/Group G	-
Fibers	-	-	Class III	-

*Not within scope of NEC. Under jurisdiction of MSHA.

Temperature Class

Maximum Surface Temperature

450°C	T1	T1	T1	T1
300°C	T2	T2	T2	T2
280°C	-	-	T2A	-
260°C	-	-	T2B	-
230°C	-	-	T2C	-
215°C	-	-	T2D	-
200°C	T3	T3	T3	T3
180°C	-	-	T3A	-
165°C	-	-	T3B	-
160°C	-	-	T3C	-
135°C	T4	T4	T4	T4
120°C	-	-	T4A	-
100°C	T5	T5	T5	T5
85°C	T6	T6	T6	T6

International Protection (IP) Codes (EN 60529: 1992)

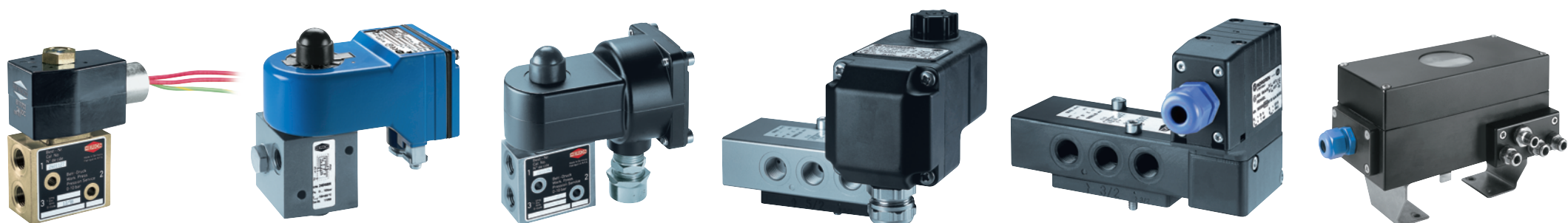
First Numeral	Second Numeral
Protection against solid bodies	Protection against liquid
0 No Protection	0 No Protection
1 Objects greater than 50 mm	1 Vertically Dripping Water
2 Objects greater than 12.5 mm	2 75° to 90° Angled Dripping Water
3 Objects greater than 2.5 mm	3 Sprayed Water
4 Objects greater than 1.0 mm	4 Splashed Water
5 Dust-Protected	5 Water Jets
6 Dust-Tight	6 Heavy Seas
	7 Effects of Immersion
	8 Indefinite Immersion

Example: IP65 – equipment is dust-tight and protected against water jets

Protection against personnel contact and comparison to IP-Codes

Enclosure types acc. to ANSI/NEMA 250 (Extract)	comparison to IP-Codes
Type 1 falling dirt	IP 10
Type 3 falling dirt, rain, snow	IP 54
Type 4 falling dirt, rain, snow, splashing and hose-directed water	IP 66
Type 4X as Type 4, in addition corrosion	IP 66
Type 6 falling dirt, hose-directed water, entry of water during occasional temporary submersion at a limited depth	IP 67
Type 6P as Type 6, but entry of water during prolonged submersion	IP 67
Type 7 for hazardous locations Cl.I, Grp.A-D (indoor)	
Type 8 for hazardous locations Cl.I, Grp.A-D (outdoor)	
Type 9 for hazardous locations Cl.II, Grp.E-G (indoor)	

...by selection of the correct components



NORGREN

Incorporating



CE MARKING
The CE mark shows that a product complies with the requirements of all European Union Directives relevant to that product.

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